



Guidelines for the Use of Antiretroviral Agents in Pediatric HIV Infection

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Monitoring of Children on Antiretroviral Therapy (Last updated November 1, 2012; last reviewed November 1, 2012)

Panel's Recommendations

- Within 1 to 2 weeks after starting a new antiretroviral (ARV) regimen, children should be evaluated to screen for clinical side effects and to ensure patient and caretaker adherence to the regimen (**AIII**). Evaluations can be conducted in person or over the phone.
- After starting or changing therapy, more frequent evaluation may be needed to support adherence to the regimen (**AIII**).
- At least every 3 to 4 months thereafter, children should have a monitoring evaluation to assess both effectiveness and potential toxicity of their ARV regimens (**AII***).

Rating of Recommendations: A = Strong; B = Moderate; C = Optional

Rating of Evidence: I = One or more randomized trials in children[†] with clinical outcomes and/or validated endpoints; I* = One or more randomized trials in adults with clinical outcomes and/or validated laboratory endpoints with accompanying data in children[†] from one or more well-designed, nonrandomized trials or observational cohort studies with long-term clinical outcomes; II = One or more well-designed, nonrandomized trials or observational cohort studies in children[†] with long-term outcomes; II* = One or more well-designed, nonrandomized trials or observational studies in adults with long-term clinical outcomes with accompanying data in children[†] from one or more similar nonrandomized trials or cohort studies with clinical outcome data; III = expert opinion

[†] Studies that include children or children and adolescents but not studies limited to postpubertal adolescents

Children who start antiretroviral therapy (ART) or who change to a new regimen should be followed to assess effectiveness, tolerability, and side effects of the regimen and to evaluate medication adherence. Frequent patient visits and intensive follow-up during the initial months after a new antiretroviral (ARV) regimen is started are necessary to support and educate the family. The first few weeks of ART can be particularly difficult for children and their caregivers. They must adjust their schedules to allow for consistent and routine administration of medication doses. Children may also experience side effects of medications, and both children and their caregivers need assistance to determine whether the effects are temporary and can be tolerated or are more serious or long-term and require a visit to the clinician. Thus, it is prudent for clinicians to assess children within 1 to 2 weeks of initiating therapy, either in person or with a phone call, to ensure that medications are being administered properly and evaluate clinical concerns. Many clinicians schedule additional contact (in person or over the telephone) with children and their caregivers during the first few weeks of therapy to support adherence. It is critical that providers speak to caregivers and children in a supportive manner using layman's terms. This promotes honest report(s) and ensures dialogue between providers and both children and their caregiver(s), even when medication adherence is reported to be inconsistent.

Baseline laboratory assessments including CD4 T lymphocyte (CD4 cell) count/percentage and HIV RNA level, complete blood count (CBC) and differential, serum chemistries (including electrolytes, blood urea nitrogen [BUN], creatinine, glucose, hepatic transaminases, calcium, and phosphorus), urinalysis, and serum lipid evaluation (cholesterol, triglycerides) should be done before initiation of therapy. A baseline assessment of ARV resistance using a genotype assay also is recommended (see [Antiretroviral Resistance Testing](#)). Within 4 to 8 weeks after initiating or changing therapy, children receiving ART should be seen to obtain a clinical history, with focus on potential adverse effects of ARVs and adherence to medications; to receive a physical examination; and to receive laboratory tests to evaluate the effectiveness of therapy (CD4 count/percentage, plasma HIV RNA **level [viral load]**) and to detect medication-related toxicities. At a minimum, laboratory assessments should include a CBC and differential, serum chemistries, and assessments of renal and hepatic function. After a change in therapy, more frequent evaluation may be needed to support

adherence to the regimen. Assessment of initial virologic response to therapy is important because an initial decrease in HIV viral load in response to ART should be observed after 4 to 8 weeks of therapy.

Thereafter, medication adherence and regimen toxicity and effectiveness should be assessed every 3 to 4 months in children taking ARV drugs. Some experts monitor CD4 cell counts and HIV RNA levels less frequently in children and youth who are adherent to therapy and have sustained viral suppression and stable clinical status for more than 2 to 3 years. [Table 15](#) provides one proposed monitoring schedule, which should be adjusted based on the specific therapy a child is receiving. Assessments should include basic hematology, chemistry, CD4 cell count/percentage, and HIV viral load. Monitoring of drug toxicities should be tailored to the particular medications the child is taking; for example, periodic monitoring of urinalysis and serum creatinine may be desirable in children receiving tenofovir, or of serum glucose and lipids in patients receiving protease inhibitors (PIs). Children who develop symptoms of toxicity should have appropriate laboratory evaluations (such as evaluation of serum lactate in a child receiving nucleoside reverse transcriptase inhibitor [NRTI] drugs who develops symptoms suspicious for lactic acidosis) performed more frequently until the toxicity resolves.

For further details of adverse effects associated with a particular ARV, see [Tables 17a–17l. Antiretroviral Therapy-Associated Adverse Effects and Management Recommendations](#).

Based on accumulated experience with currently available assays, viral suppression is currently defined as an HIV RNA level below the detection limit of the assay used (generally <20–75 copies/mL). This definition of suppression has been much more thoroughly investigated in HIV-infected adults than in HIV-infected children (see [Guidelines for the Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents](#)).¹ Temporary viral load elevations or “blips” between the level of detection and 1,000 copies/mL often are detected in adults (and children) on ART and should not be considered “virologic failure.” For definitions and management of virologic treatment failure, see [Management of Treatment-Experienced Infants, Children, and Adolescents](#).

Table 15. Sample Schedule for Clinical and Laboratory Monitoring of Children Before and After Initiation of Antiretroviral Therapy (page 1 of 2)

	Entry Into Care	Monitoring Pre-Therapy ¹	ART Initiation ¹	1–2 Weeks on Therapy ²	4–8 Weeks on Therapy	Every 3–4 Months ³	Every 6–12 Months	ARV Switch
Clinical History Physical Exam ²	X	X	X	X	X	X	X	X
CBC w/ Differential	X	X	X		X	X		X
Chemistries ⁴	X		X		X ⁴	X		X
Electrolytes	X		X			X		X
Glucose	X		X			X		X
AST/ALT	X	X	X	X ⁵	X ⁵	X		X
Bilirubin	X		X			X		X
BUN/Creatinine	X	X	X			X		X
Albumin/Total Protein	X		X				X	X
Ca/Phosphate	X		X				X	X
CD4 Count/%	X	X	X		X ⁶	X		X
HIV RNA	X	X	X	X ²	X	X		X

Table 15. Sample Schedule for Clinical and Laboratory Monitoring of Children Before and After Initiation of Antiretroviral Therapy (page 2 of 2)

	Entry Into Care	Monitoring Pre-Therapy¹	ART Initiation¹	1–2 Weeks on Therapy²	4–8 Weeks on Therapy	Every 3–4 Months³	Every 6–12 Months	ARV Switch
Resistance Testing	X							X
Adherence Evaluation			X	X	X	X		X
Lipid Panel	X		X				X	
Urinalysis	X		X				X	

¹ When therapy is started within 30 to 45 days of a Monitoring Pre-Therapy lab result, repeat testing may not be necessary.

² Children starting a new ARV regimen should be evaluated in person or by phone within 1 to 2 weeks of starting medication to screen for clinical side effects and to ensure that they are adhering to the regimen. Many clinicians will plan additional contacts (in person or by telephone) with children and caregivers to support adherence during the first few weeks of therapy. Some clinicians also recommend an HIV RNA measurement within the initial weeks of therapy for early assessment of response/adherence to therapy.

³ For children who are in a stable treatment status (non-detectable HIV RNA and normal CD4 count/percentage for at least 12 months) many clinicians are considering 6-month intervals between monitoring lab tests. Some clinicians find value in visits every 3 months even when lab testing is not performed (such as to review adherence and update dosing for interim growth).

⁴ Some ARV drugs, such as nevirapine and tenofovir, require a specific schedule frequency based on toxicity profile (see specific antiretroviral agents).

⁵ In children receiving nevirapine, serum transaminase levels should be measured every 2 weeks for the first 4 weeks of therapy, then monthly for 3 months, and every 3 to 4 months thereafter.

⁶ Some clinicians do not recommend a CD4 cell count/percentage at this time, considering it too early to expect an immunologic response.

Key to Abbreviations: ARV = antiretroviral, CBC = complete blood count, AST = aspartate aminotransferase, ALT = alanine aminotransferase, BUN = blood urea nitrogen

Reference

1. Panel on Antiretroviral Guidelines for Adults and Adolescents. Guidelines for the use of antiretroviral agents in HIV-1-infected adults and adolescents. Department of Health and Human Services. Available at <http://aidsinfo.nih.gov/contentfiles/lvguidelines/AdultandAdolescentGL.pdf>. Accessed on August 17, 2012.